REMARKS

Claims 1-39 are present in this application. Claims 33 to 39 have been added. Claims 13, 14, 28 and 29 have been withdrawn. Claims 1, 10, 13, 15, 16, 25, 28, and 34 are independent claims.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Statement of the Substance of the Interview

The Examiner is thanked for conducting the interview on June 19, 2007. As a result of the interview, Applicants and the Examiner have a better understanding of each other's position.

Allowable Subject Matter

Applicants thanks the Examiner for indicating that claims 4, 5, 8, 9, 19, 20, 23, and 24 contain allowable subject matter.

§ 112, second paragraph, Rejection

Claims 10, 15, and 25 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite. By this amendment, claims 10, 15, and 25 have been revised to correct antecedent basis. Applicants request that the rejection be reconsidered and withdrawn.

§ 102(b) Rejection – Hirohata

Claims 10-12, 15, 26, and 27 have been rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 3,506,482 (Hirohata). Applicants respectfully traverse this rejection.

Embodiments covered by claim 10 are directed to a wiring substrate where "the conductive particles of the first layer and the conductive material of the second layer are coalesced with each other at a border of the first layer and the second layer so as to form an

anchor member for uniting the first layer and the second layer." Claim 15 recites a comparable feature.

The term "coalesce" can be afforded its ordinary dictionary meaning in the context of materials science. The prefix "co-" means with, together, join, giving the word "coalesce" the meaning of to grow together, or unite into a whole.

"Coalesce" differs from related terms such as, "bonding" and "alloy."

To "alloy" means to mix so as to form an alloy, where an alloy is a mixture of two or more metals, or a metal and a non-metal.

"Bonding" means to adhere firmly, to hold together.

Unlike "alloy," "coalescence" only requires melting to the extent that particles grow together or unite into a whole.

Unlike "bonding" between layers, particles of the present invention grow together, or unite into a whole.

The Office Action states that the "heating step" will not be given patentable weight and instead relies on a disclosure of electroless metal deposition of a metal 6 over a layer of adhesive ink 3 having metal powder 4 (col. 2, lines 33-37). The Office Action indicates that the metal powder 4 teaches the claimed first layer, and that the metal layer 6 teaches the claimed second layer.

Applicants submit that electroless metal deposition of the metal 6 over the adhesive ink does not form coalescence between metal 6 and metal powder 4 in the adhesive ink. As had been previously pointed out, Hirohata does not disclose that the coupling between the metal powder 4 in the adhesive layer 3 and metal 6 is by coalescence.

Furthermore, the claims require coalescence between the conductive particles of the first layer and conductive material of the second layer sufficient "to form an anchor member for uniting the first layer and the second layer." In particular, the coalescence is carried out through heating sufficient to melt conductive particles and conductive material at the border to unite them. Hirohata only discloses heating necessary to cure the adhesive ink and in order to fix copper powder to the adhesive ink (col. 4, lines 13-15; lines 30-33). Hirohata does not disclose electroless copper deposition at a temperature that melts the copper.

For at least these reasons, Applicants submit that the rejection fails to establish *prima facie* anticipation for independent claims 10 and 15, as well as respective dependent claims.

Applicants request that the rejection be reconsidered and withdrawn.

§ 102(b) Rejection – DesMarais

Claims 10-12, 15, and 25-27 have been rejected under 35 U.S.C. 102(b) as being clearly anticipated by U.S. Patent 4,327,124 (DesMarais). Applicants respectfully traverse this rejection.

Embodiments covered by claim 10 are directed to a wiring substrate where "the conductive particles of the first layer and the conductive material of the second layer are coalesced with each other at a border of the first layer and the second layer so as to form an anchor member for uniting the first layer and the second layer." Claims 15 and 25 recite a comparable feature.

The Office Action alleges that copper powder 28 resembles the claimed first layer and solder paste resembles the claimed second layer. In particular, the Office Action alleges that solder is alloyed with the underlying conductive ink and the copper powder by applying heat to the solder layer (citing col. 4, ls. 36-42, 46-52). The Office Action alleges that the heating step causes the copper powder 28 to fuse with the solder layer, thus to create a metallic bond.

The Office Action further alleges that to alloy solder to conductive circuit segment 26, the solder is only required to be heated to a glass transition temperature, which causes the solder to soften but not in a molten state. A metallic bond can occur at a temperature when solder starts to soften. (paragraph bridging pages 4 to 5 of the Office Action).

Applicants note that the later statement that the solder only is required to be heated to a glass transition temperature appears to be the opinion of the Examiner. To the contrary, Applicants submit that DesMarais does not disclose heating the solder to a glass transition temperature, causing the solder to soften but not in a molten state. Rather, DesMarais teaches heating the solder to its melting point so that the solder alloys with the ink and copper powder to form a conductive printed circuit on the board. (col. 4, ls. 46-49).

Applicants submit that the melting point of the solder is not a high enough temperature to cause the copper powder to begin melting, which would be necessary for coalescence between

the solder and the copper powder. Rather, the bonding that results from heating the solder to its melting point is between the ink and the solder.

Applicants submit that because there would not be coalescence between the solder and copper powder, DesMarais fails to teach or suggest coalescence between solder and copper powder "so as to form an anchor member for uniting the first layer and the second layer."

For at least these reasons, Applicants submit that the rejection fails to establish *prima facie* anticipation for independent claims 10, 15 and 25, as well as respective dependent claims.

Applicants request that the rejection be reconsidered and withdrawn.

§ 102(b) Rejection – DesMarais

Claims 1-3, 6, 7, 16-18, 21, and 22 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by DesMarais. Applicants respectfully traverse this rejection.

Embodiments of the present invention covered by claim 1 are directed to a wiring material for forming wiring on a substrate by causing coalescence of conductive nanoparticles through heating, comprising:

a first layer containing conductive nanoparticles and having a binder function to be adhered to the substrate; and

a second layer containing conductive nanoparticles and laminated on the first layer, wherein

the first layer and the second layer are coupled by coalescence between the conductive nanoparticles of the first layer and the conductive nanoparticles of the second layer through heating.

The Office Action states,

"The examiner is taking the position that the conductive ink (22) resembles the claimed 1st layer and the copper powder (28) resembles the 2nd layer."

"By applying heat to the solder layer, the solder layer is alloyed with the underlying copper powders (28) and the copper powders are bounded with the copper powders in the conductive ink (22) (col 4 L 36-42 & 46-52). The Examiner is taking the position that this heating step causes the alloy layer, the copper powder (28) and the copper powder in the conductive ink (22) to form metallic bonds at the interfaces."

DesMarais at col. 4, lines 46-49, states,

"In any event, the solder is heated to its melting point, causing it to alloy with the ink and copper powder to form a conductive printed circuit on the board."

Applicants submit that the step of alloying solder with the underlying ink and copper powder by heating to the melting point of the solder would not cause coalescence between copper powder (28) and copper powder in the conductive ink (22). In particular, the melting point of the solder is far below the melting point of copper in the bulk state, and would not be sufficient for the copper power (28) to coalesce with particles in the conductive ink (22).

Furthermore, the conductive particles of the present invention are of a size in which the melting point is below the melting point of the same material in the bulk state. In order to clarify this feature, claim 1 has been amended to recite that the conductive particles are "nanoparticles."

To the contrary, DesMarais discloses copper powder that is composed of 44 micrometer particles (i.e., particles of the micro-scale).

For at least these reasons, Applicants submit that DesMarais fails to teach each and every claimed feature of independent claims 1 and 16, as well as respective dependent claims. Thus, the rejection fails to establish prima facie anticipation. Applicants request that the rejection be reconsidered and withdrawn.

New Claims

Claims 33 to 39 have been added. Applicants submit that the cited prior art fails to teach or suggest at least the claimed feature of "conductive protrusions that include a plurality of conductive particles bonded to one another and that extends from a surface of the second layer into the first layer." (see Fig. 1b).

Conclusion

In view of the above remarks, it is believed that claims are allowable.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact **Robert Downs** Reg. No. 48,222 at

the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicants respectfully petition for a one (1) month extension of time for filing a reply in connection with the present application, and the required fee of $120.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

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Respectfully submitted,

By Robert Downs #48,222

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